MASONRY UNITS WITH A MORTAR BUFFER

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Application No. 60/437,950, filed January 2, 2003, which is entirely incorporated herein by reference.

This application is related to copending U.S. utility application entitled "**MASONRY UNIT MANUFACTURING METHOD**", having attorney docket number 190514.1020, filed on July 31, 2003.

TECHNICAL FIELD

The present invention is generally related to construction products, and, more particularly, is related to masonry units installed with mortar.

BACKGROUND OF THE INVENTION

Masonry units generally include concrete masonry units and bricks that are stacked together and mortared to produce structures, such as building walls. Concrete masonry units (CMUs) include building blocks that are comprised of a mixture of aggregates, cement or other bonding agents, and other components such as admixtures. Over the years, CMUs have improved to meet architectural aesthetic requirements and performance characteristics, such as those requirements developed by the National Concrete Masonry Association (NCMA) and the American Society for Testing and Materials (ASTM), among others. For example, architectural concrete masonry units (ACMUs), which include CMUs that meet or exceed the structural criteria for CMUs (e.g., load-bearing strength of 1000 pounds per square inch (PSI) for building blocks) in addition to exhibiting added aesthetic features (e.g., pigmentation), are available with more precise cuts, polished surfaces, and larger sizes that provide a sophisticated appearance that resembles marble or granite more than conventional basement blocks.

Further, specially formulated aggregates and sealants provide for low absorption, enabling better weather and/or freeze/thaw resistance.

Despite these advances, walls constructed with CMUs still present challenges to masons and manufacturers of CMUs in their efforts to provide attractive finishes to buildings. In particular, mortar joints (e.g., the mortared area sandwiched between adjacent CMUs) have remained largely unimproved. During the installation of CMUs and or other masonry units such as bricks, edges are chipped and/or mortar is smeared on CMU (or brick) surfaces, often resulting in additional labor to clean the surfaces and the failure to meet the expectations of the owner or architect. Thus, a need exists in the industry to address the aforementioned and/or other deficiencies and/or inadequacies.

SUMMARY OF THE INVENTION

Among other embodiments, preferred embodiments of the present invention provide a masonry unit for use in mortared wall structures. Briefly described, one embodiment of the masonry unit, among others, includes a first surface and a mortar buffer that at least partially surrounds the first surface.

Other structures, features, and advantages of the present invention will be or become apparent to one with skill in the art upon examination of the following drawings and detailed description. It is intended that all such structures, features, and advantages be included within this description, be within the scope of the present invention, and be protected by the accompanying claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Many aspects of the invention can be better understood with reference to the following drawings. The components in the drawings are not necessarily to scale, emphasis instead being placed upon clearly illustrating the principles of the present invention. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the several views.

FIG. 1 is a front perspective view of an example smooth-face architectural concrete masonry unit (ACMU) with a mortar buffer around the front surface, in accordance with one embodiment of the invention.

FIG. 2 is a front perspective view of an example smooth-face, corner ACMU with a mortar buffer around the front and one of the side surfaces, in accordance with one embodiment of the invention.

FIG. 3 is a front perspective view of an example split-face ACMU with a mortar buffer around the front surface, in accordance with one embodiment of the invention.

FIG. 4A is a top plan view of the example smooth-face ACMU shown in FIG. 1, in accordance with one embodiment of the invention.

FIG. 4B is a front elevation view of the example smooth-face ACMU shown in FIG. 1, in accordance with one embodiment of the invention.

FIG. 4C is a side elevation view of the example smooth-face ACMU shown in FIG. 1, in accordance with one embodiment of the invention.

FIG. 4D is a close-up side elevation view of the mortar buffer shown in FIG. 4C, in accordance with one embodiment of the invention.

FIG. 5A is a top plan view of the example smooth-face, corner ACMU shown in FIG. 2, in accordance with one embodiment of the invention.

FIG. 5B is a close-up top plan view of the mortar buffer of the front and one of the side surfaces of the example smooth-face, corner ACMU shown in FIG. 5A, in accordance with one embodiment of the invention.

FIG. 5C is a front elevation view of the example smooth-face, corner ACMU shown in FIG. 2, in accordance with one embodiment of the invention.

FIG. 5D is a side elevation view of the example smooth-face, corner ACMU shown in FIG. 2, in accordance with one embodiment of the invention.

FIG. 5E is a close-up side elevation view of the mortar buffer of the example smooth-face, corner ACMU shown in FIG. 5D, in accordance with one embodiment of the invention.

FIG. 6A is a top plan view of two split-face ACMUs as shown in FIG. 3 prior to being split along a split line, in accordance with one embodiment of the invention.

FIG. 6B is a side elevation view of the two split-face ACMUs shown in FIG. 6A, in accordance with one embodiment of the invention.

FIG. 6C is a cross sectional view along line 6C-6C of FIG. 6B that further illustrates the mortar buffer, in accordance with one embodiment of the invention.

FIG. 7A is a schematic of an example wall structure comprising mortared smooth-face ACMUs and which illustrates how excess mortar spills from the mortar joints during installation, in accordance with one embodiment of the invention.

FIG. 7B is a cross sectional perspective view along line 7B-7B of FIG. 7A which illustrates an example trowelling action for removing excess mortar along the mortar joints, in accordance with one embodiment of the invention.

FIG. 7C is a cross sectional side view along line 7C-7C of FIG. 7B which illustrates how the mortar buffer facilitates excess mortar removal along the joints without smearing the front surface of the ACMU, in accordance with one embodiment of the invention.

FIG. 8A is a schematic of an example wall structure comprising mortared smooth-face ACMUs and which illustrates an example mortar joint striking operation, in accordance with one embodiment of the invention.

FIG. 8B is a cross sectional plan view along line 8B-8B of FIG. 8A which illustrates how a jointer tool fits into the recess formed by the mortar buffer, in accordance with one embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The preferred embodiments of the invention now will be described more fully hereinafter with reference to the accompanying drawings. In particular, the preferred embodiments of the present invention include masonry units (MUs) that are installed with mortar, the masonry units including a mortar buffer that at least partially surrounds, and preferably completely surrounds, a surface of the MU and a mortared wall structure comprising the same. Masonry units include concrete masonry units (CMUs) installed with mortar and other machine-manufactured products that are installed with mortar, such as fire-kilned, clay bricks, as well as bricks made with other constituents. Further, CMUs

included within the scope of the preferred embodiments of the invention include architectural concrete masonry units (ACMUs) that are installed with mortar. ACMUs meet or exceed the structural specifications of CMUs in addition to including added aesthetic features, such as pigmentation, surface texture, fracturing, serrating, grinding, polishing, selection of aggregates, etc. CMUs or ACMUs that are used with mortar are to be distinguished from blocks used in segmented retaining walls (SRWs), which include landscape blocks and other blocks that are dry-stacked (e.g., installed without the use of mortar). Although masonry units such as bricks and CMUs (e.g., basement blocks) that are installed with mortar are understood as being within the scope of the preferred embodiments of the invention, the preferred embodiments of the invention will herein be described in the context of ACMUs that are installed with mortar.

The mortar buffer is preferably formed during an ACMU molding operation, but can also be created through manual or automated saw-cutting and/or grinding operations in other embodiments. Additional information on one example method for manufacturing ACMUs with a peripheral mortar buffer can be found in the co-pending provisional application entitled, "Masonry Unit Manufacturing Method", filed on the same date, having attorney docket number 190514.8020, which is herein incorporated by reference. The mortar buffer preferably includes multiple planar bevel surfaces, and in application, provides buffer areas for the potential residual deposit of mortar between surfaces, for example a front surface, of the ACMU, and the mortar joint (e.g., the mortar that is sandwiched between adjacent ACMUs). The mortar buffer is preferably configured to also enable masonry tools deeper ingress into a mortar joint. The mason tools primarily "travel" on the preferably planar surfaces of the mortar buffer instead of the ACMU edges, the latter which often presents more discontinuities (especially with rough or rock face surfaces) to the mason tool that the mason attempts to overcome in his or her efforts to remove excess mortar or strike straight mortar joints. Thus, the mortar buffer can reduce mortar smears on exposed surfaces and enable the formation of substantially straight joint lines that accentuate the parallel edges of adjacent ACMUs.

In one embodiment, the mortar buffer surrounds a smooth and polished (e.g., produced using a grit level of approximately 80 or more) front surface. Note that Figures

1 and 4A-4D further illustrate this embodiment. Figures 7-8 illustrate a wall structure that also incorporates this embodiment. In another embodiment, a mortar buffer surrounds two smooth and polished surfaces (e.g., a front surface and a side surface for a corner ACMU). Figures 2 and 5A-5E illustrate this embodiment. In yet another embodiment, a split-face ACMU is surrounded by a mortar buffer, as illustrated in Figures 3 and 6A-6C when combined as an assembly of two split-face ACMUs.

Note that the reference to smooth and rough surfaces will be understood in the context that a smooth surface, when viewed on a macroscopic level (e.g., viewed at a distance of approximately 5 feet), is characterized as having a predominantly continuous and relatively even surface. For example, in some embodiments, an average peak-to-valley surface measurement of less than or equal to 1/32 inch can be used to characterize a surface as a smooth surface, with 1/64 or 1/128 being additional thresholds below or equal to which can be used to characterize additional degrees of smoothness. A molded surface of a standard basement concrete block is one example of a smooth surface, among others.

In further embodiments, a smooth surface can be further exemplified in having a reflective, shiny, and/or almost mirrored surface, similar to some polished marble or granite surfaces. An example ground surface can be characterized by an average peak-to-valley surface measurement of approximately 0.002 inch, and an example polished surface can be characterized by an average peak-to-valley measurement of approximately 0.0007 inch. A rough surface, also viewed from a macroscopic perspective, is a surface that can be characterized as having predominantly uneven surfaces, ridges, and/or projections on the surface. For example, in some embodiments, threshold peak-to-valley measurements above those described for the smooth surfaces can be used to characterize a surface as being a rough surface. Hybrids of the two surfaces (e.g., a polished surface with valleys) can be characterized in some embodiments depending on the feature that predominates the surface. For example, a polished, mirror-like front surface that comprises the majority of the front surface area in the plane of the front surface can be characterized as a smooth surface, despite the existence of interspersed valleys.

Another characteristic of the surface appearance can be the glossiness (e.g., how

shiny the surface appears). Well-known standards, such as American National Standard B46.1, can be used for guidance, among others. For example, using a laser profilometer having a resolution of 1 micron, and measuring along a defined length (*e.g.*, 50 mm substantially straight line path) along a representative surface, and further using filters (e.g., setting a cutoff frequency to be at 8 mm with a 1st order roll-off) to remove detected signals corresponding to large peak-to-valley deviations (e.g., sometimes referred to in industries as removing the "waviness" feature of a sampled surface), the arithmetic average roughness, Ra, can be determined. As is known, Ra is the arithmetic mean of departure of a roughness profile from a mean line. In other words, Ra provides an indication of "roughness" or the texture of the surface on a small-scale perspective. The values of Ra also have traditionally been used as a measure of "glossiness" for the surface. Ra can be represented as follows:

$$Ra = 1/L \quad |y|\, dx \qquad \text{(Eq. 1)}$$

where "L" is the assessment length, and the integral is evaluated from x = zero to L. In some implementations, Ra values of approximately 26 microns or less can be used to characterize a surface as shiny or reflective. The lower the value of Ra, the more shiny or reflective the appearance.

The preferred embodiments of the invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those having ordinary skill in the art. For example, although the ACMUs described and shown herein are of a generally rectangular, box-like shape, other geometrical shapes are understood to be within the scope of the preferred embodiments of the invention, including trapezoidal and square shapes, among others. Also, the ACMUs described herein include core areas shown at the back surfaces, with the understanding that core areas, of similar or different sizes, can be formed in the middle of each ACMU or elsewhere in some embodiments according to a plurality of well-known core forming configurations, or omitted altogether in other embodiments. Finally, although the mortar buffer is shown primarily around the periphery of the front surfaces of an ACMU, other surfaces that are parallel to a plane that

will receive mortar will likewise benefit from a peripheral mortar buffer and thus be considered within the scope of the preferred embodiments of the invention. Furthermore, all "examples" given herein are intended to be non-limiting, and are included as examples among many others contemplated and within the scope of the invention.

FIG. 1 is a front perspective view of an example ACMU 100 with a mortar buffer, in accordance with one embodiment of the invention. The ACMU 100 includes a front surface 108 that is surrounded by the mortar buffer, the mortar buffer comprising a bottom mortar buffer surface 102, a first side mortar buffer surface 105, a top mortar buffer surface 103, and a second side mortar buffer surface 107. Additionally, the ACMU 100 includes a first side surface 104 and a second side surface 106 opposing the first side surface 104, and outside back surfaces 110. The front surface 108, in one embodiment, can be a standard concrete masonry finish, or in other embodiments can be polished smooth to have an appearance similar to that of stone, such as marble or granite (e.g., produced by a grit level of approximately 80 or more). The back surface 110 is further delineated by core areas 112. The ACMU 100 also includes a top surface 114 and a bottom surface 116. In one embodiment, the mortar buffer is configured as multiple bevel surfaces. The top mortar buffer surface 103 connects the front surface 108 to the top surface 114. The bottom mortar buffer surface 102 connects the front surface 108 with the bottom surface 116. Similarly, the first side mortar buffer surface 105 connects the front surface 108 to the first side surface 104 and the second side mortar buffer surface 107 connects the front surface 108 to the second side surface 106. The mortar buffer connects the front surface 108 to these aforementioned surfaces along a substantially constant angle of inclination (i.e., a constant angle with respect to a chosen surface, such as the top surface 114, and the front surface 108). Although shown substantially rectangular in shape, the ACMU 100 can be embodied in other shapes and a variety of sizes for one or more of the aforementioned surfaces.

FIG. 2 is a front perspective view of an example smooth-face, corner ACMU 200 with two peripheral mortar buffers that surround more than a single surface, in accordance with one embodiment of the invention. The example ACMU 200 is preferably used as a corner unit for a wall structure such that exposed front and side

surfaces of the ACMU 200 have a similar appearance. Although one skilled in the art would understand that one or more of a plurality of exposed sides are possible for a particular wall structure, one additional exemplary surface (i.e., in addition to a front surface 208) surrounded by a second mortar buffer will be illustrated. Features of the example ACMU 200 that are similar to that shown for FIG. 1 will not be discussed, including features represented by reference numbers 206, 208, 210, 212, 214, and 216. The example ACMU 200 includes a first mortar buffer that comprises a bottom mortar buffer surface 202, a first side mortar buffer surface 205, a top mortar buffer surface 203, and a second side mortar buffer surface 207. The first mortar buffer surrounds the front surface 208. The ACMU 200 also includes a second mortar buffer comprising a second bottom mortar buffer surface 209, a third side mortar buffer surface 213, a second top mortar buffer surface 211, and a fourth side mortar buffer surface 215. The fourth side mortar buffer surface shares an ACMU edge with the first side mortar buffer surface 105. The second mortar buffer surrounds the first side surface 204. Preferably, the first side surface 204 has a similar surface finish and overall appearance to that of the front surface 208, although not necessarily limited to the features of the front surface 208. Note that all surfaces shown in FIGS. 1 and 2 are preferably molded against relatively flat interior mold surfaces and sanded and/or grounded with tools having the grit levels indicated above.

FIG. 3 is a front perspective view of an example split-face ACMU 300 with a mortar buffer that surrounds a front surface 308, in accordance with one embodiment of the invention. Similar features to those shown in FIG. 1, including items 302, 303, 304, 305, 306, 307, 310, 312, 314, and 316 will not be discussed further. As shown, the front surface 308 of the split-face ACMU 300 has a rock-like, or rough surface preferably created from splitting two ACMUs joined together along a fracture or split line, as described below. As would be understood by those having ordinary skill in the art, the split-face ACMU 300 can be embodied in varying sizes and shapes, with the rough surface on more than one or different sides of the ACMU 300 in other embodiments.

FIGS. 4A-4D are used to illustrate the example ACMU 100 shown in FIG. 1. FIG. 4A is a top plan view of the example smooth-face ACMU 100 shown in FIG. 1, in

accordance with one embodiment of the invention. As viewed from the top of the ACMU 100, shown are the front surface 108, top mortar buffer surface 103, first side surface 104, second side surface 106, and back surfaces 110 that are preferably formed using core forming objects to create core areas 112. In other embodiments, the ACMU 100 (and similarly, ACMUs 200 and 300) can be created without the use of core forming objects, or with core forming objects positioned more centrally to the ACMU 100 during the molding process, resulting in an ACMU that has a "flat" back surface. In other embodiments, core forming objects can be used in the molding process that have other shapes to create a back surface or other surface with the desired configuration.

FIG. 4B is a front elevation view of the ACMU 100 shown in FIG. 1, in accordance with one embodiment of the invention. The dashed lines shown on the front surface 108 of the ACMU 100 represent the "hidden" (i.e., hidden from the front view) edges created by the core areas 112 (FIG. 4A) of the back surface 110 (FIG. 4A). As shown, the mortar buffer comprising surfaces 102, 103, 105, and 107, as described above, appears to create a "picture frame" for the front surface 108, and joins the front surface 108 with the top surface 114, bottom surface 116, and the first and second side surfaces 104, 106 along a substantially constant angle of inclination.

FIG. 4C is a side elevation view of the ACMU 100 shown in FIG. 1, in accordance with one embodiment of the invention. This side elevation view shows the first side mortar buffer surface 105, and how the top mortar buffer surface 103 joins the front surface 108 with the top surface 114 and, similarly, how the bottom mortar buffer surface 102 joins the front surface 108 with the bottom surface 116. The dashed line represents the "hidden" edges created by the core areas 112 (FIG. 4A) of the back surfaces 110. A more detailed view of the top mortar buffer surface 103 is shown in FIG. 4D. In one preferred embodiment, the width, "X", of the top mortar buffer surface 103 (which preferably equals the width of each surface 102, 105, and 107 of the mortar buffer, FIG. 1) is approximately 7/32 inches, although the width "X" of the mortar buffer is preferably in a range between ACMUs in other embodiments from approximately 1/16 inch – ½ inch, or more, depending on the desired aesthetics, the color, shape, and size of the ACMU 100, the surface smoothness or roughness of the front surface 108, and/or the

specified width of the mortar joint, among other factors. Further, the angle of inclination α of the top mortar buffer surface 103, as well as similar angles of inclination for other surfaces of the mortar buffer (e.g., between a chosen surface, for example the bottom surface 116 (FIG. 4C), and the front surface 108), is preferably approximately thirty degrees (30°), but can range in between approximately 10° – 60° in other embodiments (as can the angle of inclination in other embodiments discussed herein) between ACMUs, depending on similar factors as those expressed above. The mortar buffer for the ACMU 100 (and those ACMUs shown in FIGS. 2 and 3) is preferably uniform in width for each ACMU, as indicated above, although not necessarily limited to uniformity in all embodiments.

FIGS. 5A-5E are used to illustrate different views of the example ACMU 200 shown in FIG. 2. FIG. 5A is a top plan view of the example smooth-face, corner ACMU 200 shown in FIG. 2 with the first and second mortar buffer, in accordance with one embodiment of the invention. The example ACMU 200 includes a top mortar buffer surface 203 and a second top mortar buffer surface 211, back surfaces 210 that include core areas 212, and further includes a first side surface 204, a second side surface 206, and a front surface 208. A more detailed plan view of the top and second top mortar buffer surfaces 203, 211 is shown in FIG. 5B. In a preferred embodiment, the top mortar buffer surface 203 preferably has a width "Z" of approximately 7/32", which is similar to the width "Y" of the second top mortar buffer surface 211. The widths of the first and second mortar buffers are preferably uniform (e.g., surfaces 202, 203, 205, and 207, FIG. 2), but are not limited as such. Note that other widths are contemplated for other embodiments, ranging from approximately 1/16 inch – ½ inch, or more, depending on various factors as described above. Further, the edge angle β comprising the angle formed between the front surface 208 and a line extending from the front surface 208 to the side surface 204 is preferably approximately forty-five degrees (45°), although other angles are contemplated for other embodiments.

FIG. 5C is a front elevation view of the example smooth-face, corner ACMU 200 shown in FIG. 2, in accordance with one embodiment of the invention. The dashed lines running vertically from the bottom surface 216 to the top surface 214 represent "hidden"

edges formed by the core areas 212 (FIG. 5A). The first mortar buffer (comprising the bottom mortar buffer surface 202, the top mortar buffer surface 203, the first side mortar buffer surface 205, and the second side mortar buffer surface 207) surrounds the front surface 208, and joins the second mortar buffer (shown in part with the fourth side mortar buffer surface 215), which surrounds the first side surface 204, at a forty-five degree angle, as described above.

FIG. 5D is a side elevation view of the example smooth-face, corner ACMU 200 shown in FIG. 2, in accordance with one embodiment of the invention. The dashed line running vertically from the bottom surface 216 to the top surface 214 represents the "hidden" edges created by the core areas 212 (FIG. 5A) located on the back surfaces 210. Also shown is the front surface 208 and the first side mortar buffer surface 205 of the first mortar buffer. The second mortar buffer is shown as well, including the third side mortar buffer surface 213, the fourth side mortar buffer surface 215 that shares an edge with the first side mortar buffer surface 205, the second top mortar buffer surface 211 and the second bottom mortar buffer surface 209. FIG. 5E is a more detailed view of a portion of the first and second mortar buffer (e.g., the second top mortar buffer surface 211 and the fourth side mortar buffer surface 215 of the second mortar buffer and the first side mortar buffer surface 205 of the first mortar buffer), wherein the angle of inclination α between a chosen surface (e.g., the top surface 214) and the front surface 208 is preferably thirty-degrees (30°), with a width "X" of approximately 7/32 inches, although other ranges of the width "X" and angle α for the first and second mortar buffers between ACMUs are contemplated (e.g., width "X" of approximately 1/16 inch – ½ inch, or more, and angle α of approximately 10° – 60°), depending on one or more of several factors as described above. As described above, the widths and angles of inclination from the front surface 208 to a chosen surface are preferably uniform for each mortar buffer (e.g., the width and angle of inclination between the front surface 208 and the first side mortar buffer surface 205 is approximately equal to the width and angle of inclination between the front surface 208 and the top mortar buffer surface 205), and can range between ACMUs as indicated above.

FIGS. 6A-6C are used to illustrate a molded assembly of two example split-face ACMUs 300a, 300b, each individual unit similar to the ACMU 300 shown in FIG. 3. FIG. 6A is a plan view of two split-face ACMUs 300a, 300b prior to being split along a split line 640, in accordance with one embodiment of the invention. Referring to a first split-face ACMU 300a, shown are back surfaces 310a having core areas 312a, a top surface 314a, a first side surface 304a, a second side surface 306a, and a mortar buffer in which the top mortar buffer surface 303a is shown. Symmetrical with the first split-face ACMU 300a is a second split-face ACMU 300b that is joined to the first split-face ACMU 300a at the split line 640. The second split-face ACMU 300b is similarly structured to the first split-face ACMU 300a, and thus features 303b, 304b, 306b, 310b, 312b, and 314b will not be discussed further. Note that the split line 640 formed around the periphery of the molded assembly comprising the split-face units 300a, 300b provides a fracture point for splitting the two units since the distance between top, side, and bottom surfaces has been reduced at the split line 640.

FIG. 6B is a side elevation view of the two split-face ACMUs 300a, 300b shown in FIG. 6A, in accordance with one embodiment of the invention. Referring to one split-face ACMU 300a, the dashed line running from the bottom surface 316a of the first split-face ACMU 300a to the top surface 314a represents the "hidden" edge (i.e., hidden when viewing the first side surface 304a) created by the core areas 312a (FIG. 6A) of the back surfaces 310a. Also shown is the first side mortar buffer surface 305a of the mortar buffer. Features 304b, 305b, 310b, 314b, and 316b of the second split-face ACMU 300b are symmetrical to the first split-face ACMU 300a, and will thus not be discussed. Note that in other embodiments, the individual but joined ACMUs 300a, 300b need not necessarily be symmetrical across the split line 640, nor is an assembly limited to two units.

FIG. 6C is a cross sectional view along line 6C-6C of FIG. 6B that further illustrates the angle of inclination and width of the mortar buffer, in accordance with one embodiment of the invention. Using the mortar buffer surface 305a as a representative example, the angle of inclination α of the mortar buffer surface 305a (e.g., the angle formed between the first side surface 304a and the first side mortar buffer surface 305a) is

preferably approximately forty-five degrees, although α can range from approximately 10° – 60° in other embodiments. Further, in a preferred embodiment, the width "X" of the first side mortar buffer surface 305b (as is true for the first side mortar buffer surface 305a) is approximately ¼ inches, with a range of approximately 1/16 inch – ½ inch in other embodiments. The first side surfaces 304a and 304b (symmetrical to 304a) are separated by the mortar buffer surfaces 305a, 305b a distance "Z" of approximately 1 inch. Note that "Z" can vary between ACMUs depending on the angle α. Note that due to symmetry in a preferred embodiment, the dimensions of the first split-face ACMU 300a preferably also apply to the second split-face ACMU 300b, though not limited as such in all embodiments.

FIGS. 7A-7C illustrate an example mortared wall structure 720 that includes a plurality of smooth face ACMUs 700. In particular, FIG. 7A is a schematic of an example wall structure 720 comprising smooth-face ACMUs 700 placed upon each other during an installation, separated by mortar 730. FIG. 7A illustrates how excess mortar 730 spills from the mortar joints 770 during installation, in accordance with one embodiment of the invention. During installation, a mason typically dispenses the mortar 730 on top surfaces 714 (and side surfaces) of the ACMUs 700 using a hand trowel 750. The mason then places an ACMU 700 down on the mortar 730 set upon the top surfaces 714 and pushes or taps down approximately ¼ inch, the downward movement represented by the downward arrow. As the mason pushes the ACMU 700 down, mortar 730 begins to be forced outward from the mortar joint 770, causing mortar 730 to spill into and possibly beyond the mortar buffers (e.g., first side mortar buffer surfaces 705, top mortar buffer surfaces 703) of one or more ACMUs 700. At this stage, the mason begins to clear the mortar buffers of the mortar 730 spilled from the mortar joint 770 using the hand trowel 750 to prevent mortar from depositing on the front surface 708, as further illustrated along line 7B-7B shown in FIG. 7B.

The mortar buffer surfaces, such as the top mortar buffer surface 703, are configured (by virtue of the separation distance the mortar buffer causes between adjacent surfaces and/or the angle of inclination) in a manner that helps to reduce the amount of excess mortar 730 that is deposited on the front surface 708 of the ACMU 700 when the

mason scrapes off the excess mortar 730 with the hand trowel 750, or other tool. As further detailed along line 7C-7C (FIG. 7C), mortar 730 in the mortar joint 770 likely (although not necessarily) extends into the mortar buffer, for example onto the bottom mortar buffer surface 702 and/or the top mortar buffer surface 703. The mortar buffer is configured to enable the hand trowel 750 to extend closer to the mortar joint 770, thus reducing, or eliminating, the amount of mortar 730 that is smeared across the front surface 708 of the ACMU 700, as well as providing a buffer that allows mortar 730 to be deposited without depositing on the front surfaces 708. Further, the relatively straight-angled surfaces of the mortar buffer (e.g., the top mortar buffer surface 703 and the bottom mortar buffer surface 702) provide a relatively smooth surface that the mason can rest the edge of the hand trowel 750 on, enabling smoother and straighter mortar joint lines that accentuate the ACMU edges.

FIGS. 8A-8B illustrate how the preferred embodiments of the invention facilitate striking the mortar joints 870. FIG. 8A is a schematic of an example wall structure 820 comprising smooth-face ACMUs 800 placed upon each other via mortar and which illustrates an example mortar joint striking operation, in accordance with one embodiment of the invention. As shown, the mason uses a jointer 860 or other appropriate hand tool to "strike" the "head" mortar joints (vertical mortar joints 870) located vertically between front surfaces 808 of adjacent ACMUs 800, as well as "bed" mortar joints (horizontal mortar joints 880). Although shown as a stacked wall structure (continuous vertical mortar joints 870 from one ACMU 800 to another) 820, one skilled in the art will understand that other configurations can be installed, such as running bond arrangements, among others. Although the size of the mortar joints 870, 880 are typically 3/8 inch, the preferred embodiments of the invention contemplate a variety of mortar joint sizes and are not so limited to 3/8" mortar joints 870, 880. Viewing the wall structure and mortar joint along line 8B-8B, as shown in FIG. 8B, the jointer 860 is typically concave in shape and available in different sizes and configurations. In this example, the mortar buffer (shown are the first side mortar buffer surface 805 and second side mortar buffer surface 807) forms a "well" or "groove" that substantially conforms to the concave configuration of the jointer 860, enabling further ingress of the jointer 860 into the mortar

joint 870 and reducing the amount of mortar 830 that is deposited on the front surface 808 of the ACMU 800 (FIG. 8A). Note that other joint configurations are contemplated to be within the scope of the preferred embodiments of the invention, including "V" joints, among others.

Although the wall structures 720 (FIG. 7A) and 820 (FIG. 8A) are shown with smooth face ACMUs, one skilled in the art will understand that rough face ACMUs are also included within the scope of the preferred embodiments.

It should be emphasized that the above-described embodiments of the present invention, particularly, any "preferred" embodiments, are merely possible examples of implementations, merely set forth for a clear understanding of the principles of the invention. Many variations and modifications may be made to the above-described embodiment(s) of the invention without departing substantially from the spirit and principles of the invention. All such modifications and variations are intended to be included herein within the scope of this disclosure and the present invention and protected by the following claims.